

# SPARE PARTS INVENTORY & CONTROL



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# Spare Parts Philosophy

 **COST**

 **PROBABILITY OF FAILURE**

 **REPLACEMENT TIME**

 **REPAIRABILITY**

 **PROGRAM IMPACT**

# DIII-D Systems Breakdown

## Tokamak Systems

- Computer Systems
- Mechanical Systems
  - Vacuum
  - Cryogenic
  - Water

## Heating & Current Drive Systems

- EC Systems
- IC Systems
- NB Systems
- EE Systems
- ~~•~~ Power Systems
- ~~•~~ High Voltage
- ~~•~~ I&C Systems

# Tokamak Systems

## Computer Systems

- One Spare for Each Computer Type
  - Alpha, Pentium, HP
- One spare HD per Operational Computer
- Minimum One Power Supply per Type

# Tokamak Systems

## Mechanical Systems

- **Vacuum**

- Rebuild parts for larger pumps**

- One Hot Spare for Smaller Pump Types**

- Overnight Replacement**

- Bellows**

- One Each Type**

- On PM Schedule**

# Tokamak Systems

## Mechanical Systems Vacuum

- Consumables

~~V~~Seals Copper 500/yr

~~V~~Seals Helicoflex® 4-6/yr

~~V~~Seals “O” ring 600/yr

- Mechanical

~~V~~Vacuum Pumps 5/yr

~~V~~Vacuum Valves 4/yr

~~V~~Vacuum fittings/flanges ~100/yr

~~V~~Gages 20/yr

# Tokamak Systems

## Mechanical Systems Cryo & Water

- Water

- ~~4~~ Motors & Pumps 8

- ~~4~~ Seals, Bearings, Couplings

- ~~4~~ Flow & Pressure Switches

- Cryo

- ~~4~~ 400hp Motpr 1

- ~~4~~ Flow & Pressure Switches

- ~~4~~ Mechanical Seals

- ~~4~~ Gages, Transducers, switches

# Heating & CD Systems

## Electron Cyclotron Systems

- Computers
  - Power Supplies
  - Imbedded Control Boards (PCBs)
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- GYROTRONS
  - MAGNETS
  - MAGNET POWER SUPPLIES





# Heating & CD Systems

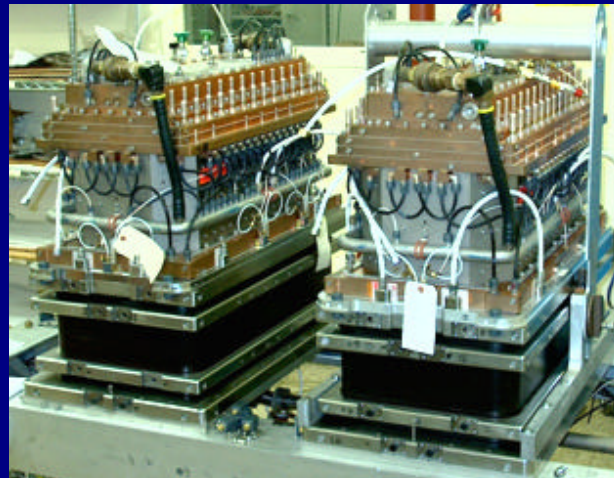
## Ion Cyclotron Systems

- **Tetrodes** 1
- **Power Supplies** 1
- **Majority of Individual Components**
- **Solid State RF Amplifier** 1
- **Main Breaker & Fuses** 1/set

# Heating & CD Systems

## Neutral Beam Systems

- Ion Sources 2
- Rebuild Kit 1+
- Backup Computer & CAMAC Modules 1
- Gages, Meters, Relays 1set



# Heating & CD Systems

## High Voltage Systems

- **Tetrodes** 3-4
- **12.47kV Breakers** 4
- **Ignitrons** 8
- **Various PC Boards** 2-3/ type
- **Misc. Parts Based on Historical Data**

# Heating & CD Systems

## Power Systems

- Chopper Capacitor Drawers (four) 144+
- SCRs & Other Components (four) 32+
- Spare Breakers 1/type

### Rebuild Parts 1-2

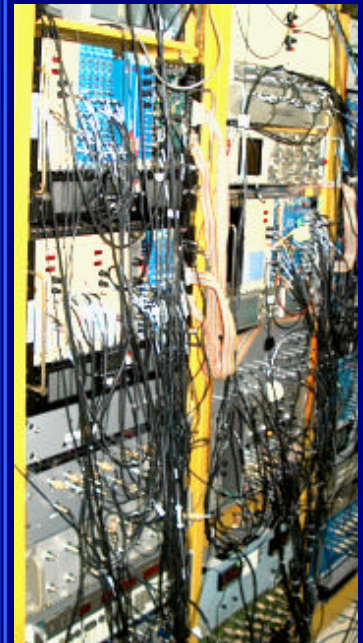
- Batteries (24v&48v) 4
- Control, Limit, & Timer Modules 3-4)

### Transformers

# Heating & CD Systems

## Instrumentation & Control

• CAMAC	~62 types	Types	Quantity
• Digitizers	11	2-10	
• Create Controllers		5	2-4
• Memory Modules		8	2-20
• Create Power Supplies	2	4-6	
• Specialty Boards			
• Integrators		4	2-3
• Isolation Amplifiers		3	2
• V to F & F to V optical links			2-4
• Signal Filters			
• Oscilloscopes		>4*	2-4*



# No Spares or Refurbishment Kits

✂ MAGNET POWER SUPPLIES





✂ POWER TRANSFORMERS

✂ GYROTRONS

✂ MAGNETS



# Summary

-  **Historical (PM/CM Records)**
-  **Program Impact (Response time critical)**
-  **Rebuild Capability**
-  **Specific to Each Area**